



# NEYER, TISEO & HINDO, LTD.

CONSULTING ENGINEERS

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September 11, 1984  
Project No. 84272 OC

B & V Construction Company  
25301 Novi Road  
Novi, Michigan 48050

ATTN: Mr. Donald J. Treder

RE: Clay Cap Evaluation  
BASF - Wyandotte Landfill  
Riverview, Michigan



Dear Mr. Treder:

This letter presents the results of evaluation tests on a mixture of Bag Nos. 4, 7 and 9 of the silty clay material being used as a clay cap for the above referenced project. These results have been verbally relayed to your office and other concerned parties.

Eight bags of brown and gray silty clay material, designated as Nos. 4 through 9, were delivered to our office. These bags were reportedly obtained between Elevations 586 and 595 from the approximate locations shown on the attached Bag Sample Location Plan (Figure 1) from the Wayne County Sewage Abatement site at Goddard and Moran in Taylor, Michigan. Because of the uniformity of the silty clay soils in the bags, the bag materials were combined into three samples and a series of evaluation and permeability tests were performed on each. Bag Nos. 4, 7 and 9 were combined into one sample, Bag Nos. 6 and 11 into another and Bag Nos. 5, 8 and 10 comprised the third sample.

Test results on a mixture of Bag Nos. 4, 7 and 9 material consisted of Modified Proctor, sieve and hydrometer analysis, Atterberg limits and permeability. The results of the proctor, sieve analysis and Atterberg limits are presented on the attached Figures 2, 3 and 4. These results indicate that the combined bag material has a "CL" designation according to the Unified Classification System, and is essentially the same material as Bag Nos. 2 and 3 which have been previously approved for use as a clay cap.

Three permeability tests were performed on samples of the silty clay that were prepared and compacted in brass liners (3-inch long and 1-3/8-inch in diameter). The soil was compacted to a density of approximately 90 percent of the Modified Proctor value at different moisture contents. The permeability test results are as follows:

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<u>Liner No.</u>	<u>Remolded Density (pcf)</u>	<u>Percent Compaction*</u>	<u>Percent Moisture</u>	<u>Coefficient of Permeability (cm/sec)</u>
1	104.2	90.1	13.1	$4.1 \times 10^{-8}$
2	104.3	90.1	15.0	$3.9 \times 10^{-8}$
3	103.9	89.8	19.5	$3.7 \times 10^{-8}$


\*Based on a maximum Modified Proctor density value of 115.7 pcf at an optimum content of 15.2 percent.

The results of the evaluation tests indicate that the mixture of ~~materials~~ materials has a permeability coefficient of less than  $1 \times 10^{-7}$  cm/sec, and is therefore considered suitable for use as a clay cap.

If you have any questions about this letter or the attached data, please call.

Very truly yours,

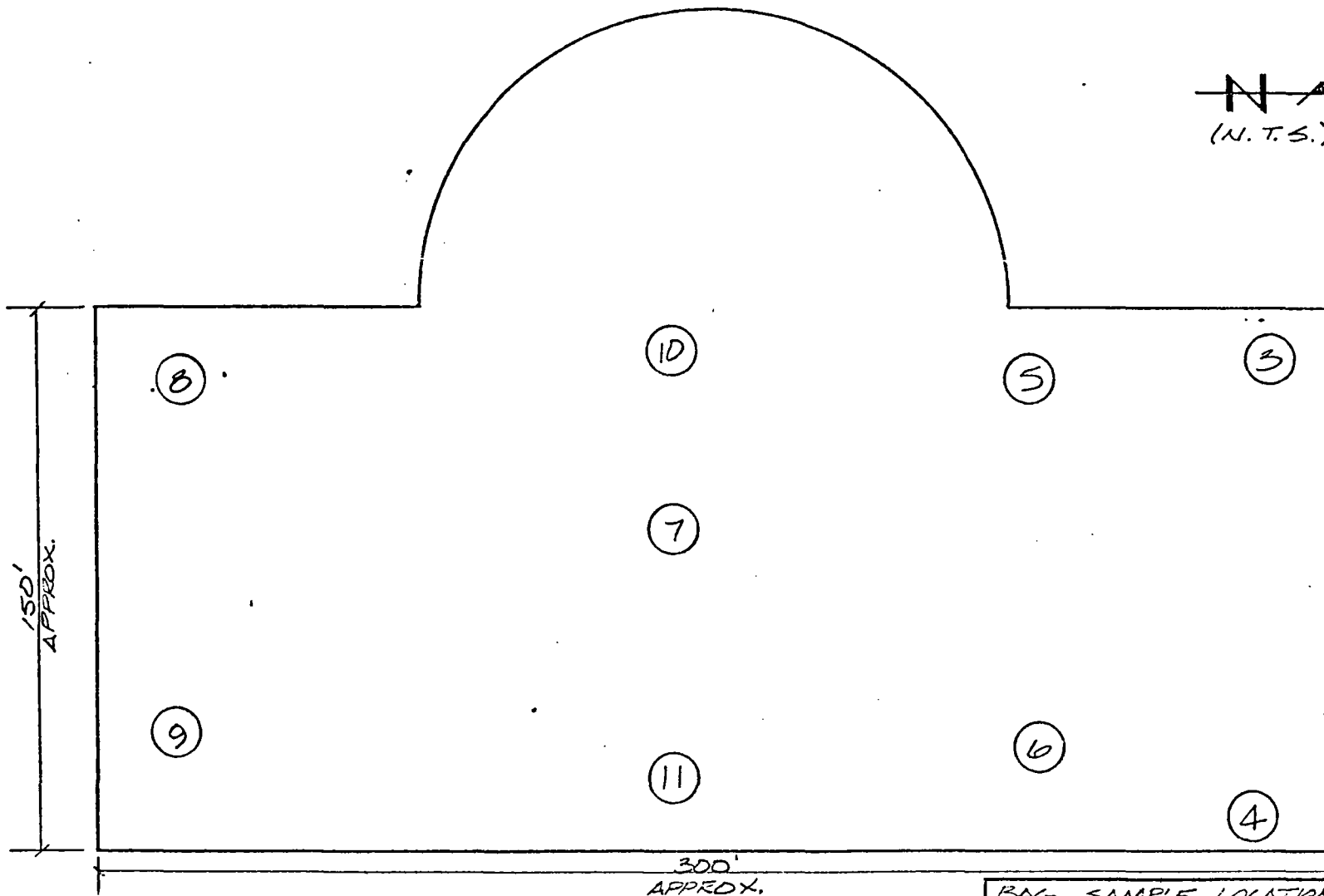
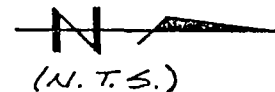
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D. Nona, P.E.

DN/alm  
Attachments



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LEGEND:

- ② APPROXIMATE LOCATION OF BAG SAMPLES OBTAINED FROM WAYNE COUNTY SEWAGE ABATEMENT. SITE AT GODDARD AND MORAN IN TAYLOR, MICHIGAN. ALL SAMPLES OBTAINED BETWEEN ELEVATIONS 586 TO 595'

BAG SAMPLE LOCATION PLAN  
LILLY CAP ELEVATION BASE  
WYANDOTTE LANDFILL  
RIVER VIEW, MICHIGAN



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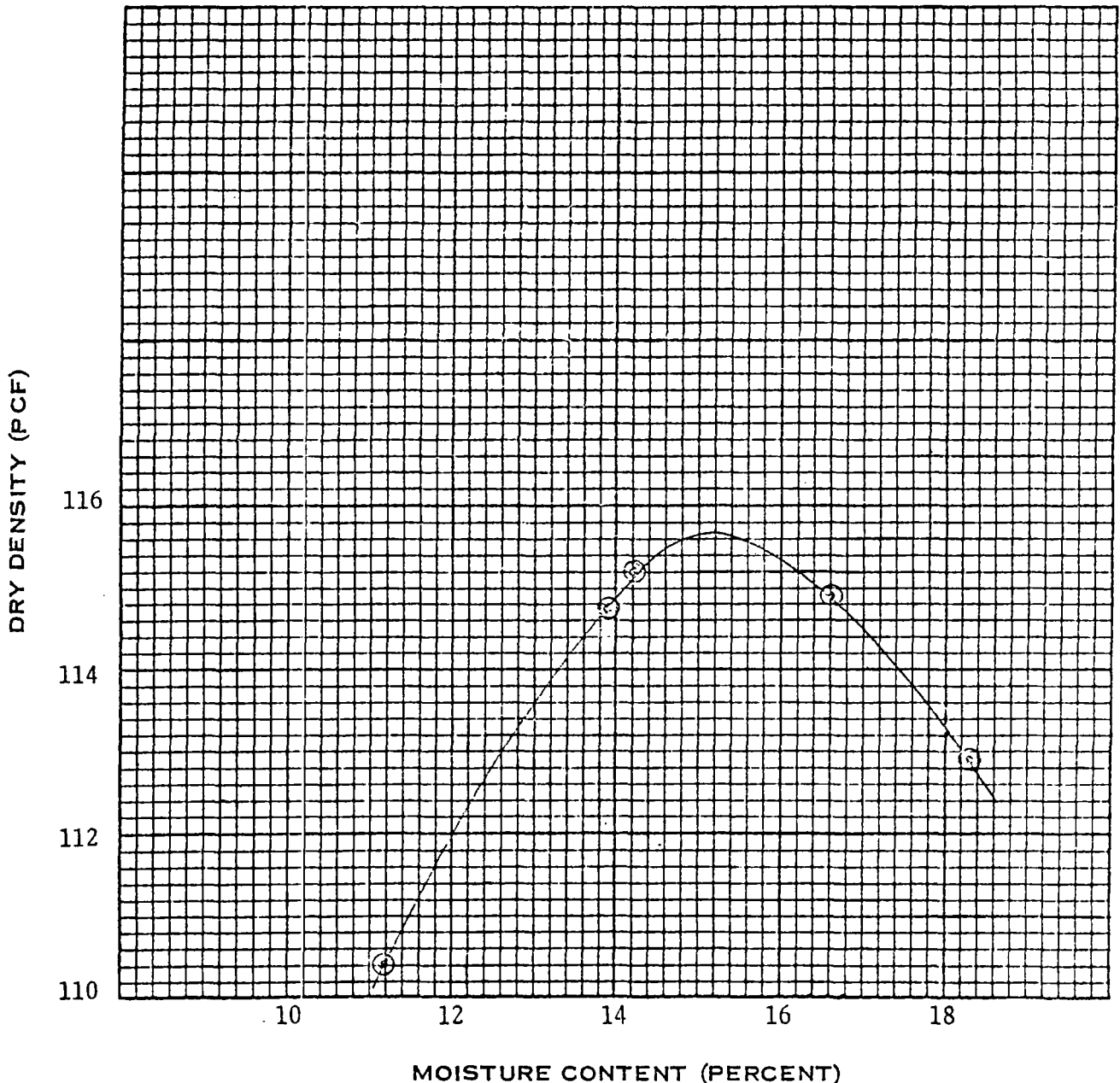
PROJECT NO. 154777	DRAWN BY: JEP	DATE: 9.19.82
SCALE: 1" = 100'	CHECKED BY:	SHEET 1 OF 1

FIG. 1

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MOISTURE - DENSITY RELATIONS

PROJECT No. 84272 PROJECT: BASF Wyandotte Company Landfill, Riverview, MI  
Sample Source Wayne County Sewage Abatement Site, Taylor, Michigan  
BAG SAMPLE No. 4, 7 & 9 SAMPLE DEPTH between Elevation 586 & 595  
SAMPLE DESCRIPTION Brown and Grey Silty Clay, Trace of Sand  
METHOD OF COMPACTION ASTM 1557 Method A  
MOLD: No. A DIA. 4.0 IN., HT. 4.584 IN., VOLUME 0.333 CU. FT., WT 9.32 LBS.  
TESTED BY: K.S. CHECKED BY: E.W. DATE: 8/20/84



MAXIMUM DRY DENSITY 115.7 PCF OPTIMUM MOISTURE CONTENT 15.2 %  
REMARKS: \_\_\_\_\_

Figure 2

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GRAIN SIZE DISTRIBUTION CURVE

PROJECT NO. 84272 LAB SAMPLE NO. 118 SOURCE BASF Wyandotte Company Landfill, Riverview, MI  
 Sample Location Wayne County Sewage Abatement Site, Taylor, MI FOR \_\_\_\_\_  
 BORING NO. \_\_\_\_\_ FIELD SAMPLE NO. Bags 4, 7 & 9 SAMPLE DEPTH \_\_\_\_\_ SAMPLE ELEV. between Elev. 586 & 595  
 SAMPLE DESCRIPTION Brown and Gray Silty Clay with Trace of Sand.  
 DATE SAMPLED 8/15/84 BY B&V DATE TESTED 8/21/84 BY RSL CHECKED BY EW

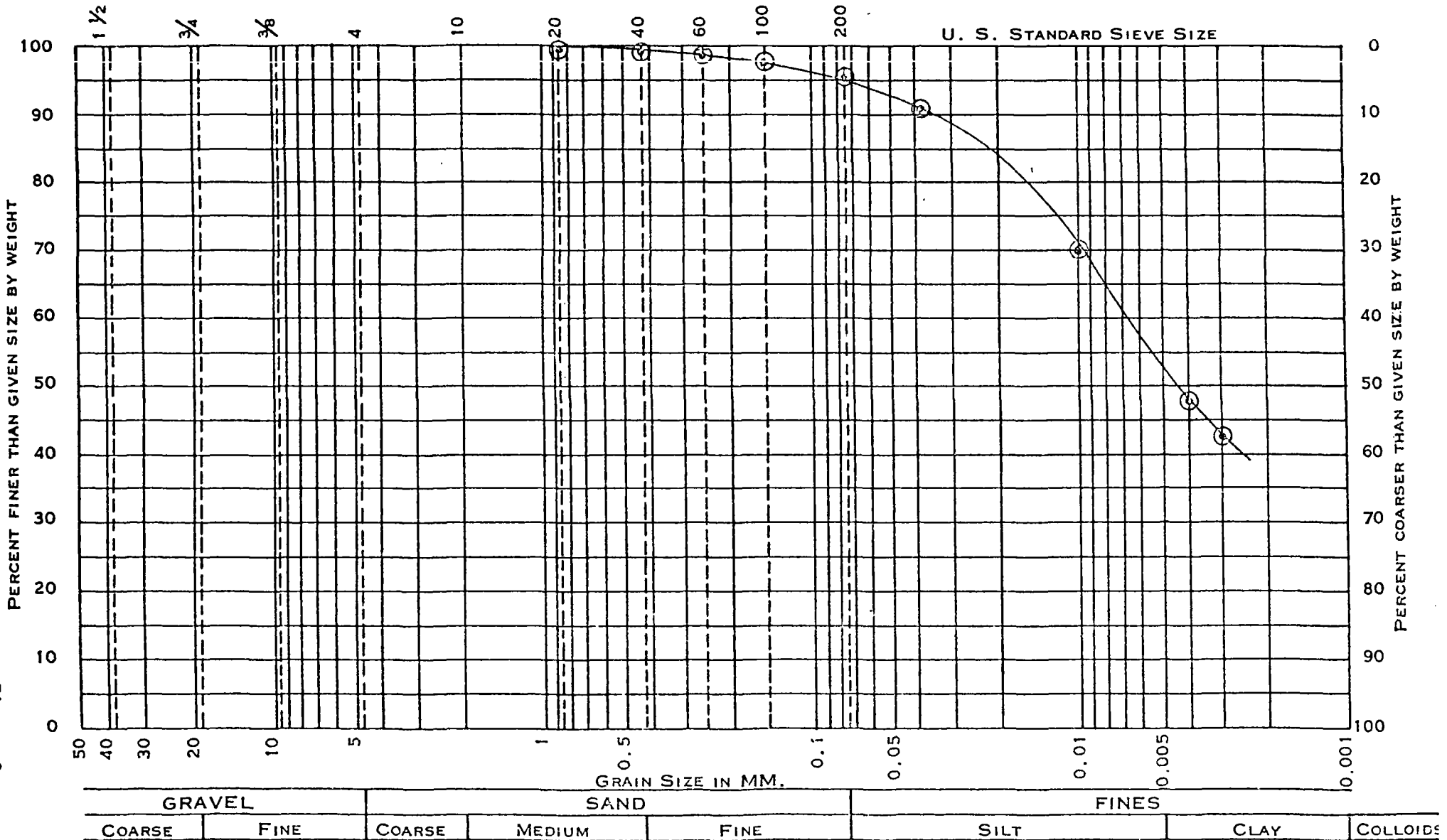


Figure 3

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**SOIL CONSTANTS**

LA SAMPLE No. \_\_\_\_\_ PROJECT No. 84272 FOR BASF Wyandotte Company Lanfill, Riverview, M  
Sample Source Wayne County Sewage Abatement Site, Taylor, Michigan  
BORING No. \_\_\_\_\_ FIELD SAMPLE No. Bgs. 4, 7 & 8 SAMPLE DEPTH \_\_\_\_\_ SAMPLE ELEV. between Elev.  
SAMPLE DESCRIPTION Brown and Gray Silty Clay with Trace of Sand 586 & 595

TESTED BY: SY CHECKED BY: EW DATE 8/21/84

**MOISTURE CONTENT**

SPECIMEN DESIGNATION									
TARE NUMBER									
WET WEIGHT + TARE (GR)									
DRY WEIGHT + TARE (GR)									
WEIGHT OF MOISTURE (GR)									
WEIGHT OF TARE (GR)									
DRY WEIGHT (GR)									
MOISTURE CONTENT (%)									

**LIQUID AND PLASTIC LIMITS**

PURPOSE OF TEST									
NUMBER OF BLOWS	<u>29</u>	<u>23</u>							
TARE NUMBER	<u>A-10</u>	<u>A-17</u>	<u>A-51</u>						
WET WEIGHT + TARE (GR)	<u>23.83</u>	<u>24.30</u>	<u>23.10</u>						
DRY WEIGHT + TARE (GR)	<u>19.63</u>	<u>20.00</u>	<u>20.87</u>						
WEIGHT OF MOISTURE (GR)									
WEIGHT OF TARE (GR)	<u>10.86</u>	<u>11.38</u>	<u>11.38</u>						
DRY WEIGHT (GR)									
MOISTURE CONTENT (%)	<u>47.9</u> <u>48.8</u>	<u>49.9</u> <u>49.4</u>	<u>23.5</u>						

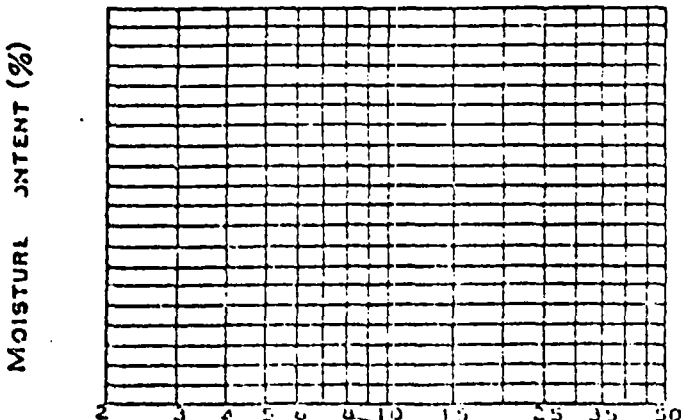
**SPECIFIC GRAVITY  $G = G_0 W_0 \div (W_0 - W_1 + W_2)$**

SPECIMEN DESIGNATION		
PYCNOMETER NUMBER		
WT. PYC., SOIL, WATER ( $W_1$ ) (GR)		
TEMPERATURE (DEGREES CENT.)		
WT. PYC., WATER ( $W_2$ ) (GR)		
TARE NUMBER		
DRY WEIGHT + TARE (GR)		
WEIGHT OF TARE (GR)		
DRY WEIGHT ( $W_0$ ) (GR)		
SPECIFIC GRAVITY, WATER ( $G_0$ )		
SPECIFIC GRAVITY, SOIL ( $G$ )		

**UNIT DENSITIES AND VOLUMETRIC ANALYSIS**

SPECIMEN DESIGNATION				
WET WEIGHT + TARE (GR)				
WEIGHT OF TARE (GR)				
WET WEIGHT (GR)				
MOISTURE CONTENT (%)				
DRY WEIGHT (GR)				
SAMPLE LENGTH (IN)				
SAMPLE DIAMETER (IN)				
SAMPLE VOLUME (CU IN)				
SAMPLE VOLUME (CC)				
WET DENSITY (GR/CC)				
DRY DENSITY (GR/CC)				
WET DENSITY (PCF)				
DRY DENSITY (PCF)				
WEIGHT OF WATER (PCF)				
SPECIFIC GRAVITY				
VOLUME OF SOLIDS (%)				
VOLUME OF LIQUIDS (%)				
VOLUME OF AIR (%)				
SATURATION (%)				

**LIQUID LIMIT FLOW CURVE**



LIQUID LIMIT (LL)	<u>49</u>
PLASTIC LIMIT (PL)	<u>24</u>
PLASTICITY INDEX (LL - PL)	<u>25</u>

Figure 4